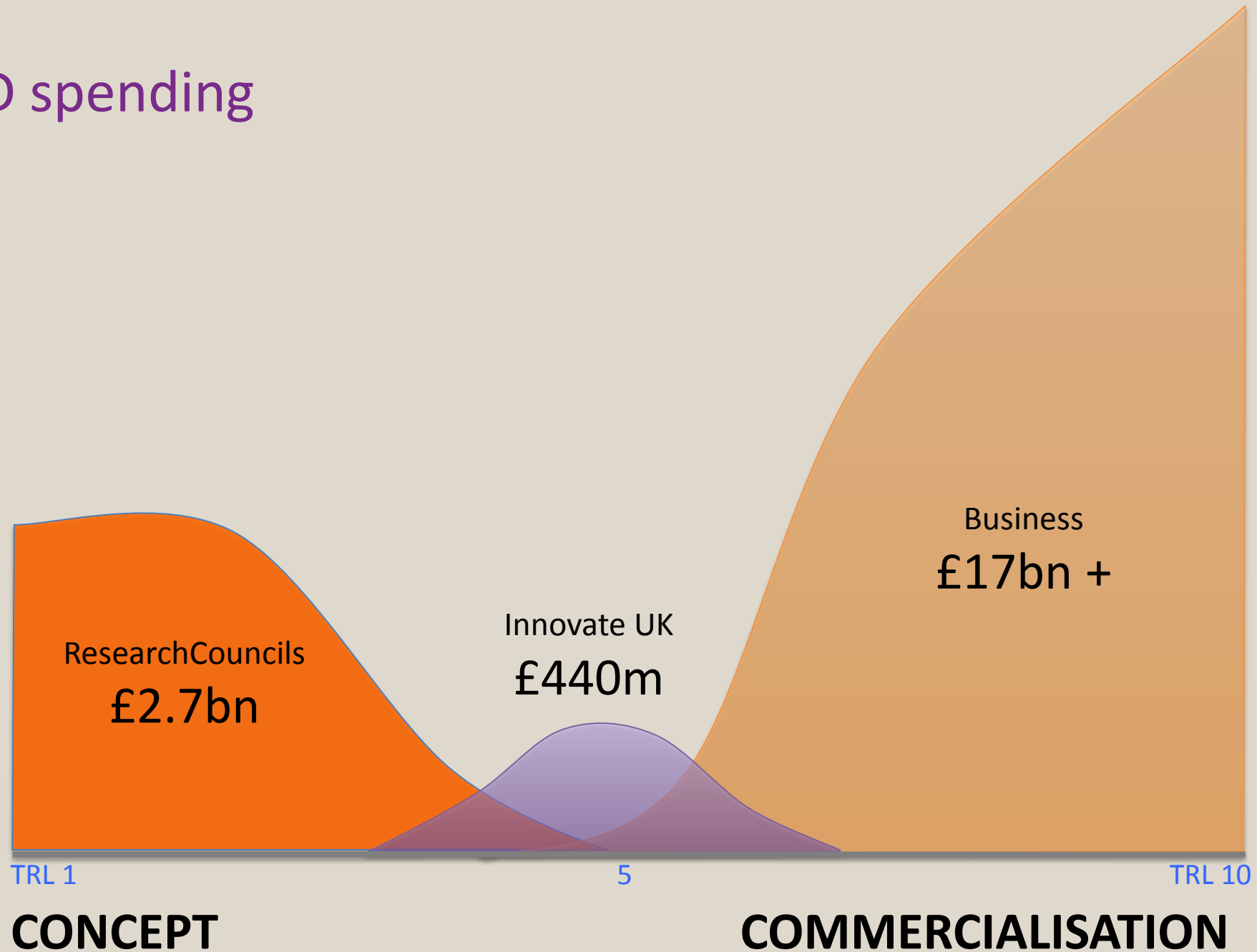


Update from UK's Innovation Agency

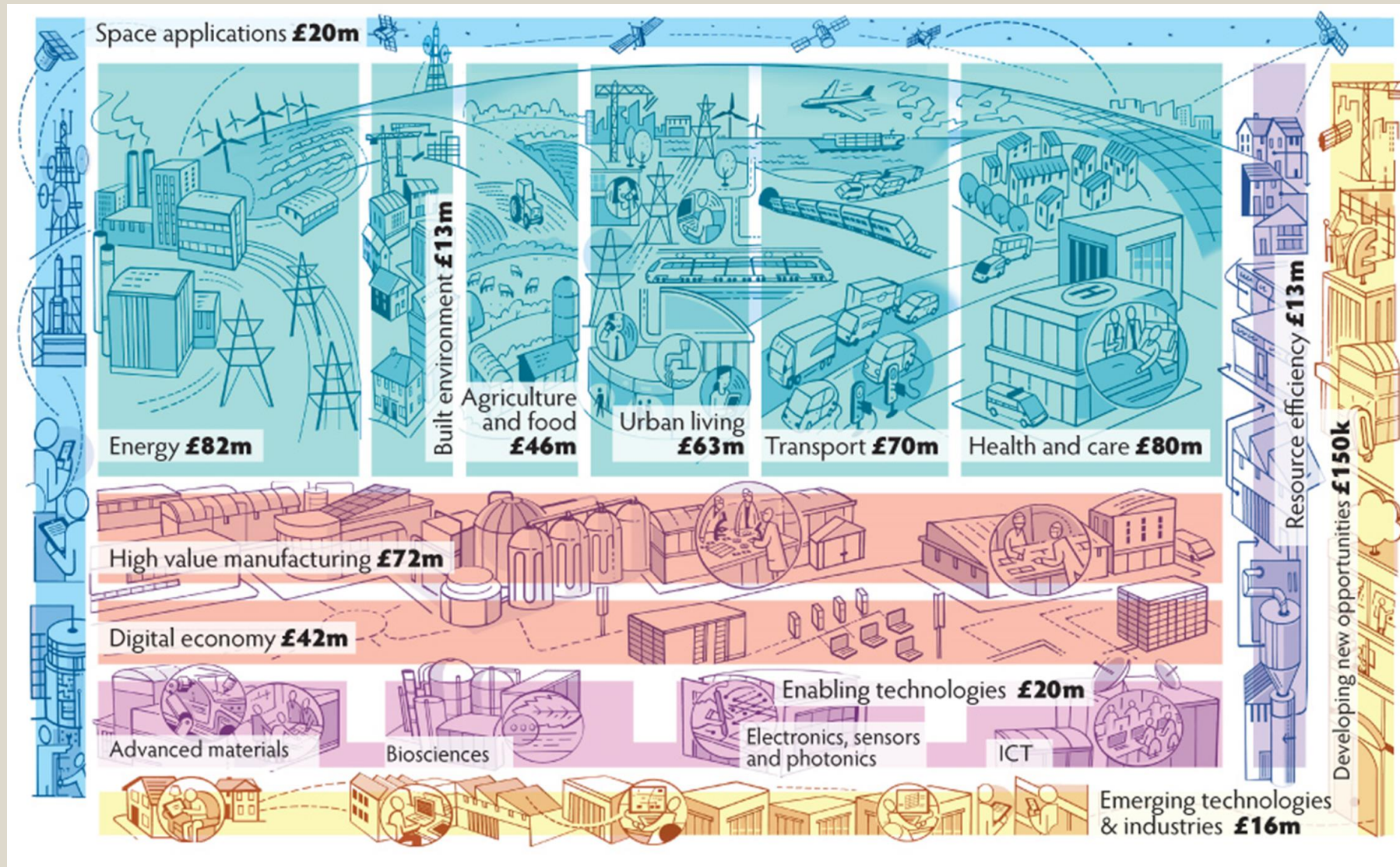
Andy Proctor
Lead Technologist

Innovate UK

UK R&D spending



Where we focus



Galileo Satellite Status

SV	Status	Comment
IOV 1	SIS transmission, all carriers, Nav msg on	Operational
IOV 2	SIS transmission, all carriers, Nav msg on	Operational
IOV 3	SIS transmission, all carriers, Nav msg on	Operational
IOV 4	E1 SIS transmission, dummy nav message	Antenna problem
FOC FM1	SIS transmission on, dummy nav message. IOT in progress. SAR on	Incorrect orbit
FOC FM2	SIS transmission on, dummy nav message. SAR not on	Incorrect Orbit
FOC FM3	SIS transmission all carriers, IOT procedures compete, SAR not on	Nearly operational
FOC FM4	Payload IOT in progress	Commissioning
FOC FM5	Payload testing in progress. In orbit (Launched Sept)	IOT in progress
FOC FM6	Payload testing in progress. In orbit (Launched Sept)	IOT in progress

As of 02 November 2015

Galileo System Status

- Ground segment deployment well under way
 - 14 GSS, 5 ULS, 6 receiver chains, operational and validation chains migrating to new software
- Mass-market receiver testing campaign ongoing
 - STM, Mediatek, Broadcom, uBlox, Furuno, SR, Qualcomm and Intel
- Qualification testing for Ariane launcher under way
- UTC vs. GST (modulo 1 second) offset/95% percentile/6.99ns v $\leq \pm 50$ ns target
- Galileo to GPS Time Offset/95% percentile/8.45ns v $\leq \pm 14$ ns target
- Galileo System Operator contract under bidding phase
- On track for Initial Services in 2016 (EC)

Why am I telling you this?

- The European Commission (EC) and EU GNSS Agency (GSA) are looking to specify a timing service for Galileo users
- The EC/GSA are looking at ways to increase penetration of Galileo into the timing space
 - Under the guise of European Critical Infrastructure (for timing)
 - Potentially via regulation/legislation
 - Also implementation via standards into multiple applications
- GSA funding available for implementation of Galileo
 - Via “Fundamental Elements” call process (timing Rx for critical infrastructure)
 - Via H2020 calls
- GSA looking to collaborate/cooperate
- All Europeans in the room are paying for this

H2020 - Applications in Satellite Navigation

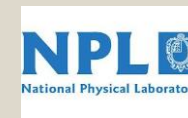
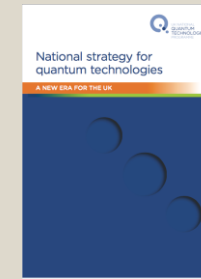
Topics - 2017	Type	Budget
GALILEO-1-2017: EGNSS Transport applications	IA	€14.5M
GALILEO-2-2017: EGNSS mass market applications	IA	€9M
GALILEO-3-2017: EGNSS professional applications	IA	€8M
GALILEO-4-2017: EGNSS awareness raising and capacity building	CSA	€1.5

GALILEO-3-2017: EGNSS Professional Applications

Build on the enhanced capabilities offered by Galileo that'll provide **high accurate timing information and authentication services**, to develop a new generation of high performing, reliable and EU independent timing and synchronisation applications

The UK Quantum Technologies programme

- Announced by George Osborne in Autumn 2013
- A five-year programme
- Exploiting science to develop a range of technologies
- Focussed on wealth creation
- Industry and academia working together



First funding round- April 2015

- 36 applications for funding were received
- £4.7m of funding was provided
- 50% of funding went to academic partners



Nokia • Alpha Contract Engineering • University of Oxford • Kelvin Nanotechnology • NPL • Optocat Holdings • Rushmere technologies • TerOpta Oxford Instruments • Lancaster University • Element 6 • Warwick University • RSK group • Cold Quanta • UTC aerospace • Thales • UCL

Cross Govt PNT group

Did you know we had one?

- Purpose:
 - to share information on all matters relating to Position, Navigation and Timing (PNT)
 - across all governmental departments and regulatory bodies.
 - PNT sources include but are not restricted to;
 - Global Navigation Satellite Systems (GNSS) (including GPS and Galileo)
 - Anti-jam & interference detection systems
 - Alternative navigation technologies (e.g eLoran, Quantum, inertial sensors and atomic clocks).
 - All applications are covered, navigation and timing and protection systems
- Most govt depts. represented, inc DfT, DfH, HO, MoD, CAA, FCO....
- We are actively seeking input on new technologies, techniques, applications & users.....

Take aways

- The UK's Innovation **Agency** is here to help (fund and connect)
- Galileo is coming to timing and sync (like it or not)
 - think about how to get involved (or miss out)
 - I can help
- UK QT programme is looking at UK atomic clocks
 - Feed your requirements in NOW
 - I can help
- There is a go to place in Government.
 - Do you want to engage?
 - I can help

We can't stop thinking about the future

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